Oil and Gas Industries Meeting Notes
June 23-24, 1999

Opening Comments

On June 23rd and 24th 1998, the Greenhouse Gas Technology Verification Center hosted two meetings with the Oil and Natural Gas industries. Attendees at the first meeting (The Operator Meeting) included, producers, transmission companies, service providers, and environmental consultants. Attendees at the second meeting included, vendors of compressor seals, valves, fittings, and other GHG reduction technologies. All attendees were invited to join the Oil and Gas Industries Stakeholder Group.

Although identified as currently lacking, both groups expressed a need for independent performance verification data, and both helped the Center identify and prioritize parameters and technology types most in need of verification. Most participants acknowledged that the ETV Program had a role to play in increasing the availability of dependable verification data in the GHG technology area, and several strategies for accomplishing that were discussed.

The Vendor Meeting notes can be found below.

Summary of the Vendor Meeting
June 24, 1998

Holiday Inn Select, Houston, TX

Meeting Overview

The meeting started with welcoming remarks from Stephen Piccot. Mr. Piccot summarized the meeting goals, desired outcomes, and agenda. He presented the Greenhouse Gas Technology Verification Center's (the Center) Mission Statement then discussed operating principles of the Environmental Technology Verification Program (ETV) program, outlined the Center's programmatic goals and strategies, and described factors and events leading up to the establishment of the 12 ETV pilots. Dr. David Kirchgessner also offered welcoming comments, and stressed the importance EPA places on receiving industry guidance. He expressed hope that the meeting participants would become advocates for the Center's mission, and assist in prioritizing verification testing candidates.

After the welcoming remarks, each participant introduced themselves. Attachment A lists the individuals present at the meeting, and identifies those individuals that expressed strong interest in the program, but were unable to attend. Following the introductions, Mr. Andy Taer of GeoSciences, Inc., discussed his company's experience in the ETV program. He began by making an analogy of the ETV program as being similar to the

Consumer Reports. He identified several benefits of going through the verification process, such as, the ability to use the verification statement and the report as a marketing tool. He identified some weaknesses in his ETV experience, including: a lack of outreach activities, timeliness, and tests being conducted under relatively narrow field conditions.

Mr. Taer's talk was followed by Sushma Masemore's discussion on the technology verification process. She presented the ranked order list of greenhouse gas (GHG) mitigation technology focus areas identified by the Center's Executive Stakeholders. She indicated that the oil and natural gas industries were ranked at the top of the list, and that this meeting was organized to prioritize technologies to be tested.

Ms. Masemore described the solicitation, selection, testing, and reporting activities that the Center will execute. The process described consisted of the following: (1) inviting vendors to submit pre-test applications, (2) conducting engineering evaluations to determine their readiness for testing, (3) preparing initial test plans based on input from the oil/gas industry technology stakeholder group, (4) negotiating/signing commitment letters, (5) preparing test and quality assurance plans, (6) executing verification tests, and (7) reporting and distributing performance results. The results will be reported in two formats. A verification report, a mandatory requirement for participating, and a verification statement. The Center plans to start at least one test by the fall of this year. Additional technologies will be tested and new technology prioritization exercises will occur over the next 3 to 5 years.

Following this talk, a joint presentation by Mr. Bob Lott of the Gas Research Institute and Mr. Don Robinson of ICF Kaiser, Inc., focused on GHG emissions from the oil and gas industries and specific technologies that reduce methane emissions. This technology list, presented in Attachment B, was presented at the previous day's operating group meeting. The list became the focal point for conducting open discussions later in the day.

Following lunch, an open discussion was initiated. The session was fruitful and many specific issues were addressed. At the outset, the topics proposed for discussion included: Topic 1- Vendors' comments on the GHG emission reduction technologies list and Topic 2- Vendors' perceived barriers to implementation and how ETV can help. Highlights from the discussions are summarized on the following page.

Topic 1: Vendors' Comments On GHG Emission Reduction Technologies

In this session, the vendors' were asked to supplement the technology list with additional options not yet identified. The vendors' were then instructed to identify the technologies that indicated the products offered by their companies. This exercise was conducted to gauge the representativeness of the participating audience. Representatives from eleven companies were present at the meeting, and each specialized in at least one or more technology categories listed in Attachment B.

In summary, the technology list shown in Attachment B, was perceived to be 90 percent complete. The vendors' identified three additional technologies. These included new ring technologies that reduce emissions from compressor seals, new valve packing material, and flare gas recovery systems.

Following this exercise, the vendors' were shown the previous day's results of the technology voting that were conducted with the oil and gas industry operators'. The rank ordered list, shown below, represents the prioritized list of technologies that the operators' identified as needing independent verification testing. The vendors' then commented on the operators' list and discussed other technologies that did not make the list.

1. All technologies capable of reducing leaks from compressor systems (i.e., dry seals, static packs, and leak capture and reinjection devices),
2. Use of smart regulators in distribution systems,
3. Recovery of low pressure gas and subsequent utilization,
4. Regenerator vapor conditioner system,
5. Micro-turbines, and
6. Electro-mechanical valve controllers.

In general, the vendors agreed with the top technology group selected by the operators (reducing leaks from compressor stations). They confirmed the commercial availability of promising compressor seals and leak capture devices, compressor rod packing systems, and improved compressor seal designs. They were confident about their products' performance capabilities, and seemed eager to validate them and demonstrate their usefulness to the industry. Attachment C summarizes vendor comments on specific technologies that were discussed in this session.

Topic 2: Vendors Perceived Barriers to Implementation and How Can ETV Help?

In this open discussion, a brain storming exercise was conducted to identify barriers to technology implementation, and how ETV can help overcome these barriers. In general, there was broad support for the ETV program, and most participants felt that their companies could benefit from independent verification testing.

The vendors identified four groups of barriers, which included: economics, performance, communication, and regulatory acceptance. The economics and performance related barriers could be addressed with verification test data. Specifically, the ETV reports can include independently verified technology performance results, technology costs and cost effectiveness, test site characteristics and its representativeness of other facilities, and technology durability/maintenance requirements. The remaining two barriers are inherently addressed with ETV operating guidelines. Specifically, the stakeholder process gets information into the hands of decision-makers within companies and regulators.

Other ETV outreach activities and coordinations with organizations prominent in their respective industry areas can help disseminate performance results to the right people. Attachment D discusses additional comments provided by the vendors.

Perhaps largest amount of time was spent discussing the verification of technology costs. The vendors confirmed the industries' reluctance to consider higher cost products, and they welcomed the idea of ETV performing cost/benefit analysis to illustrate the cost effectiveness of their technologies. The vendors noted that cooperation from industry is needed to compare costs between an existing technology and a new low emission technology (i.e., industry must provide capital, operating, and maintenance costs for technologies currently used). The vendor would provide the capital, operating, maintenance, and other cost savings information for their product. The Center would report the cost benefit results in terms of pay out periods.

In conclusion, Mr. Brian Phillips described the roles of the oil/gas industries stakeholder group. Participants were invited to become stakeholders if they were interested in recommending technologies and test parameters. Mr. Phillips explained that the Center would strive to form a diverse group of members (about 25) comprised of operators, regulators, consulting engineers, service providers, and technology vendors. The Center will select members' within two weeks, and notify them of their status soon after.

The meeting was adjourned after the Center coordinators highlighted the next steps. These included: (1) inviting vendors to participate and submit pre-test applications for the top 2-3 candidate technologies, (2) finalizing the stakeholder group make-up, (3) preparing an initial test plan and obtaining stakeholder guidance for the first test, (4) negotiating and signing commitment letters for this test, and (5) preparing a test/QA plan.

Attachment A

Oil/Natural Gas Industry Representatives Interested In The ETV Program

Company	First Name	Last Name
AA Environmental Seals	Bud	Johnson
Zero Seal Technology	Douglass	Gifford**
Zero Seal Technology	Carl	Coles
Lee Cook and Dover Res.*	Robert	Borders**
Rotor Tech*	Richard	Garrett**
PGI, Int'l	Laurie	Nimberger
UMC Automation*	Paul	Renard**
T.F. Hudgins, Inc.*	Bob	Parr**
John Zink Co.*	Scott	Fox

Becker Precision*	Olan	Hillard
Indaco Air Quality Services*	Touche	Howard
Roll-Reynolds*	Dave	Hargett
Phillip Black*	Phillip	Black
Hy-Bon Engineering	Arnold	Tims
France Compressor Products	James	Maholic
Adwest Technologies	Joseph	Terry
Anderson Enterprises, Inc.	George	Jacobs
Smith & Dennison	Warren	McGowen
Ametek-PMT Equipment, Inc.	Bob	Irving
John Crane Int'l	George	Springs
Pipeline Pigging Products, Inc.	Spenser	Cubage
Rama Fabrication, Inc.	Sonny	Walter
Worcester Controls Group	Tom	Seaks
A. G. Equipment, Inc.	Charles	Presley
Laser Imaging Services	Tom	McCray
Groth Corp.	Leann	McMurtee
Control Systems Specialists, Inc.	Bob	Loupe
BW/IP Int'l. Inc.	John	Marta
Porta-Test Int'l Inc.	Bill	Kocken

* Present at the Houston Meeting on June 24

** Signed up to become a stakeholder

Attachment B

GHG Environmental Technologies For The Oil And Gas Industry

Category	Technology	Applicable to		Technology Vendors Present At the Meeting
		Production Sector	Transmission & Distribution Sector	
Gas Compressor Systems	Replace Wet Seals with Dry Seal Systems in Centrifugal Compressors		☑	A&A Env. Seals Zero Seal Technology

	Compressor Seal Leak Capture and Reinjection			A&A Env. Seals Lee Cook & Dover Res.
	Install Electric Compressors	☑		
	Install Electric Starter	☑	☑	UMC Automation
	Use of Gas Turbines at Compressor Stations		☑	UMC Automation
	Replace Ignition System to Reduce False Starts	☑	☑	
	Convert Engine Starting to Nitrogen	☑		
	Install Instrument Air Compressor	☑		
	Install Electric Motors		☑	
	Use Catalytic Converters on Compressors	☑		
	Use Clocking Solenoids		☑	
Vapor Recovery	Install Vapor Recovery Units on Crude Tanks	☑		John Zink Co. UMC Automation
	Use Nitrogen Eductors for Vapor Recovery	☑		A&A Env. Seals Jonh Zink Co.
Separators	Install Flash Tank Separators on Glycol Dehydration Units	☑	☑	
	Install Pumps for Separators	☑		UMC Automation
Glycol Dehydration	Link Dehydrator Unit to Incinerator	☑		

	Use Electric Pumps in Glycol Dehydrators	☑		Rotor Tech
Pneumatics	Pneumatic Device Replacement (High-Bleed with Low-Bleed)	☑	☑	Becker Precision
	Convert Pneumatics to Nitrogen/Air/Mechanical Weights	☑		
Leak Detection/ Measurement	Perform Fugitive Emissions Tests	☑		Indaco Air Quality Services
	Leak Measurement	☑	☑	Indaco Air Quality Services
	Leak Detection	☑	☑	Indaco Air Quality Services UMC Automation
Valves/Regulators/ Orifice Meters	Use Smart Regulators	☑	☑	
	Install Unit Valve Shut-offs		☑	UMC Automation
	Use Excess Flow Valves		☑	
Pipelines	Replace Plastic Pipe	☑		
	Use Flexible Insert Liners for Gas Mains and Service Lines		☑	
	Identify and Rehabilitate Leaky Dresser Coupled Pipe		☑	
Safety	Install Electronic Safety Devices	☑		UMC Automation
	Install Overpressurization Protection System		☑	Becker Precision UMC Automation
Maintenance Practices	>Redesign Piping to Reduce ESD from Annual to Triennial		☑	Zero Seal Technology

	Install Drip Trap Ball Control Devices			
Other	Make Kimray Replacements/Retrofits	☑	☑	
	Convert Gas Driven Chemical Pumps to Electric/Air/Nitrogen	☑		Rotor-Tech
	Install Fuel Recovery Systems and Static Packs		☑	Lee Cook & Dover Res.
	Install Evacuator	☑		
	Install Plunger Lifts in Gas Wells	☑		
Venting/Flaring	Modify System Operations to Reduce Venting	☑	☑	UMC Automation A&A Env. Seals
	Install Flare System at Tank Batteries	☑		John Zink Co.
Technologies Added by the Operators	Electro-Mechanical Valve Control Devices	☑	☑	UMC Automation Zero Seal Technology
	Micro-Turbines	☑	☑	
	Down hole water separators	☑		
	Regenerator vapor conditioners	☑		UMC Automation
	Recovery of Low Pressure Separator Gas	☑	☑	UMC Automation

Technologies Added by the Vendors	New Compressor Seal Rings	☑	☑	Lee Cook & Dover Res.
	Valve Stem Leakage Devices	☑	☑	Zero Seal Technology
	Flare Gas Recovery Systems	☑		John Zink Co.

Attachment C

Technology Vendor Comments On Prioritized Technologies

Technology	Function	Vendors' Comments
Compressor Seal Leak Capture and Reinjection Devices	Gas leaks at compressor stations can be captured by a containment gland and fed back into a compressor engine fuel line	-Once this is installed, system requires no additional maintenance -Capturing leaking gas can improve industry's bottom line and control GHG emissions
Static Packs	When the compressor is shut down, these devices create a working seal around the shaft and/or pistons using pressurized air or gas to actuate pistons that load the seals. When the pressure is released, the seals retract.	-Glad to see operators interested in performance data of units that have been used for many years -Defined industry awareness of GHG emissions from compressor stations as a reason for needing improved data set -Eager to provide test data showing how well static packs can reduce GHG emissions. -Offered existing installations as a way to quantify long term durability and reliability issues
New Ring Seals	Reduce emissions from gas engines and control oil consumption	-Relatively new product on the market -Over 200 sets with good success have been sold thus far -Identified difficulty reaching larger producers

Attachment D

Technology Vendor Comments On Barriers To Implementation

Barrier to Technology Implementation	How ETV Can Help
Economics -Industry reluctance to consider higher cost products -Lack of cost benefit evaluations -Lack of knowledge on actual costs for technologies currently employed	-Provide technology costs and cost benefits -Conduct cost evaluation on existing operation and new products -Industry should provide cost data on existing products -Vendors should provide costs on their products -Center will conduct cost benefit analysis and report payout periods
Communication -Industry is generally unaware of product performance -Independent testing is needed to give credibility -Reaching the right decision maker within a corporation is required -Structured outreach efforts are not present -Customers often do not recognize or accept that a problem exists -Resistance from field operators to change a conventional approach	-Use ETV documents as training guidelines to operators -Disseminate information via stakeholders, other program offices and trade organizations -Get the information in the hands of decision makers within companies
Performance -Lack of field test data -Beta test sites are needed with industry cooperation -Lack of information on technology limitations and operating ranges -Availability of quality assured performance data	-Provide independent corroboration of a technology's performance -Maintain consistency with ISO 9000 quality standards -Get stakeholders to help identify beta test sites
Regulatory Acceptance -Lack of knowledge or resistance from permit writers -Resources required to jump through multi levels of regulatory processes	-Provide performance data that would help meet regulatory requirements -Forward performance information to regulators